;login:

The USENIX Association Newsletter

CONTENTS

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*UNIX is a trademark of Bell Laboratories.

A Conference Done Well

The Winter 1983 technical meeting of the Association, held in conjunction with /usr/group and the Software Tools Users Group, was the largest conference held to date. This conference was held at the Town and Country Hotel in San Diego from January 25 through January 28, 1983, and attracted over 1850 paid attendees and 65 vendor booths. There were 4 tutorial sessions, and 79 technical papers delivered during three days of technical sessions.

The Board of Directors of the USENIX Association would like to publicly thank the Conference staff and the host institution, the University of California at San Diego, for a big job well done. In particular, we want to recognize the work done by:

Tom Uter — General Chairperson
Bill Appelbe — Technical Co-Chairperson
Jim McGinness — Program Committee
Judy DesHarnais — Local Arrangements Chairperson
Harry Kerman, Conventions West — Operations Manager

The overall coordination of USENIX Association technical meetings has been, and is the responsibility of John Donnelly, the Association's Vice President. This major volunteer commitment and effort has been the keystone of the success of our conferences, and a special note of appreciation and recognition is in order for his work.

Lou Katz
President

Joint Statement by /usr/group and USENIX Regarding Joint Meetings

The following statement was issued jointly by Bob Marsh, the president of uniFORUM, and Lou Katz, the president of the USENIX Association, on January 28, 1983, at UNICOM.

As many of you are aware, there have been extensive discussions between the Boards of uniFORUM (formerly /usr/group) and the USENIX Association regarding the future of joint meetings. It is the intention of both Boards to sponsor joint meetings for the entire UNIX community. However, the timing and logistics for the next conference are such that a joint meeting in the summer is not feasible. Accordingly, the USENIX Association and the Software Tools Users Group will sponsor a technical conference in Toronto during the week of July 11, 1983. This conference will include a vendor exhibition. uniFORUM will sponsor a larger exhibition and conference approximately one year from now in a location to be determined shortly. Both Boards will continue to cooperate in sponsoring joint activities as appropriate. Direct your comments to Board members of both organizations.

The USENIX Association Toronto Meeting

The Summer, 1983, technical meetings of the USENIX Association and the Software Tools Users Group will be held July 12→15 in Toronto, Ontario, Canada, at the Harbour Castle Hilton Hotel. The host of the meeting will be Human Computing Resources Corporation. The local arrangements chairperson is Suzanne MacNary. Local arrangements are being handled by Rogal America. The technical program chairperson for USENIX is Michael Tilson of HCR.

A pre-registration packet and other information on the meeting will be mailed in March. Further information on the meeting may be obtained from:

Rogal America
72 Langley Road
Newton Centre, MA 02159
(617) 965-1000

First Call for Papers for USENIX for Toronto

The Toronto meeting will feature both a conference and an exhibition devoted to the topics of interest to the UNIX community. Presentations are invited in all areas of the UNIX system.

UNIX Application
This area includes graphics, data base systems, office automation, word processing, and other applications.

UNIX Systems
This area includes the implementation of network and distributed systems for porting of UNIX to new computer systems and system management and performance.

UNIX Programming Tools
This area includes utility programs, programming environments and new programming languages and implementation.

The UNIX World
This area includes standards, analysis of commercial trends, and other related topics.

Talks are expected to be primarily technical in nature. Talks describing new products are encouraged. However, such descriptions must focus on genuine technical issues. Authors must describe new and interesting work. Talks presented at previous meetings will be rejected even if re-titled or repackaged. Selection of items will be based on the submission of abstracts. Abstracts must contain sufficient detail to allow the program committee to determine the suitability of a presentation, but should not exceed 1,000 words.

Abstracts must contain the following information:

Title
Name of author
Institution or company
Mailing address
Phone number (and network address if available)
Audio-visual requirements

Abstracts must be submitted by 18 April 1983. The program committee will notify authors of acceptance by 1 June 1983. Abstracts should be submitted to the program chairman:

Michael Tilson
Human Computing Resources Corp.
10 St. Mary Street
Toronto, Ontario Canada M4Y 1P9

(416) 922-1937
decvax!hcr!hcrvax!mike

Electronic mail is preferred.

The program committee also intends to schedule other kinds of presentations, including panel discussions and invited speakers. We are open to suggestions from both the academic and commercial communities. Suggestions to the committee should be submitted as soon as possible.

First Call for Exhibitors at Toronto

All companies interested in exhibiting at the Toronto Conference are invited to send for an exhibitors kit. Please address your request to Paula at Rogal America at the address above.

Exhibitors kits will be mailed in March to companies that exhibited at previous meetings.

Call for Papers for the Software Tools Users Group Toronto Meeting

Presentations are invited for the Software Tools Users Group meeting in Toronto. Talks may include descriptions of projects using *ratfor* and/or the tools, newly-created or enhanced tools, thoughts about future directions for the tools, software portability and programming environments, or other areas of interest to the tools community.

Abstracts for proposed talks should be submitted to the Software Tools program chairman:

Neil Groundwater
Analytic Disciplines, Inc.
8320 Old Courthouse Road, #300
Vienna, VA 22180
703-893-6140

They must contain the following information:

Title
Name of author
Institution or company
Mailing address
Phone number (and network address, if available)
Audio-visual requirements

Suggestions for other types of presentations are also solicited.

Boston and San Diego Meeting Proceedings

The Summer 1982 Boston meeting proceedings are still available. They are over 350 pages long and cost $25 per copy, with an additional charge of $10 per copy for overseas postage. The Boston proceedings may be ordered by mail from:

/usr/group
PO Box 8570
Stanford, CA 94305

Payment for the Boston proceedings must accompany the order; make checks payable to "/usr/group".

The San Diego meeting conference proceedings cost $15 per copy for members of USENIX, /usr/group, or Software Tools Users Group, or $20 for non-members. There is an additional charge of

$5 per copy for overseas postage. The San Diego proceedings may be ordered from:

> Software Tools Users Group
> Attn: UNICOM Proceedings
> 1259 El Camino Real, #242
> Menlo Park, CA 94025

The deadline for ordering the San Diego proceedings has been extended to March 31, 1983. Payment for the San Diego proceedings must accompany the order; checks should be made payable to "Software Tools Users Group".

Draft Standard for UNIX — Compatible Systems Available for Review

The /usr/group Standards Committee, chaired by Heinz Lycklama, has been working on a System Interface Standard for operating systems that are functionally compatible with UNIX. They now have a draft standard ready for review and have specifically requested comments on the draft from members of USENIX.

The purpose of the standard is set forth in the Standards Committee's statement of purpose:

> The purpose of the /usr/group Standards Committee is to formulate, adopt, publish, and promote a formal standards specification, based on the UNIX operating system, for a commercial operating system. This standards specification is intended to assist persons producing or acquiring products based on the UNIX or functionally-compatible operating systems in accurately predicting the behavior of the products in the context of a specific implementation.

The Standards Committee is composed of about 30 members from various segments of the UNIX community. It has members from and has received support from Bell Laboratories.

The standard will be based on System III and will attempt to maintain compatibility with Version 7 wherever possible. The effort has concentrated on the original sections 2 and 3 of the System III User's Manual. Special attention has been given to reducing or eliminating particularly machine-dependent functions.

Extensions (facilities not described in AT&T UNIX documentation) have been solicited. One — dealing with the problem of controlling contention between multiple concurrent processes for shared data files ("record locking") — has been included in the draft standard.

The draft standard and a reviewer's guide are available for review. The reviewer's guide provides background information, points out important technical aspects of the draft standard, and lists the system calls and subroutines in the draft along with their System III, Version 7 and 4.1BSD equivalents. The documents are available for $50 per set from

> /usr/group
> P.O. Box 8570
> Stanford, CA 94305

Comments on the draft must be received by July 6, 1983. The comments will be incorporated into the draft standard to produce a proposed standard, which will be distributed to and voted on by all general members of /usr/group in the fall of this year.

[There is a paper in the San Diego Proceedings by Heinz Lycklama, the chairperson of the /usr/group Standards Committee, that describes the workings of the Standards Committee in some detail...Ed.]

Draft Standard Videotex/Teletext Presentation Level Protocol Syntax Available for Review

BSR X3.110-198X, the draft proposed American National Standard Videotex/Teletext Presentation Level Protocol Syntax (North American PLPS) is beginning a four-month ANSI public comment period which ends May 21, 1983.

Copies of the draft standard (referred to as BSR X3.110 or more simply as NAPLPS) are available for $18 along with your mailing label from:

X3 Secretariat
CBEMA
311 First Street, N.W., Suite 500
Washington DC 20001

Brief Description of NAPLPS

Videotex and Teletext services are envisioned as two-way and one-way services, respectively, providing users with access to "pages" or "frames" that include alphanumeric text and pictorial information. NAPLPS is an information interchange standard that specifies the formats, rules, and procedures for the encoding of this information for Videotex and Teletext services in 7-bit and/or 8-bit bytes. NAPLPS capabilities include alphanumeric text supporting 40 Latin-based languages, a dynamically redefinable character set (DRCS), mosaic picture elements, picture description instructions (PDI), and macro definitions. Additional capabilities include color mapping, a controllable stroke width, continuous character scaling, programmable texture masks, unprotected fields, partial screen scrolling, and incremental encoding for highly compact descriptions of certain classes of images.

NAPLPS is an information interchange standard that permits Videotex and Teletext information and transaction service providers and equipment manufacturers to develop their products according to an agreed interchange format. Without such agreements, information providers, service providers, and terminal manufacturers would not be willing to make the initial and continuing investments that are necessary for Videotex and Teletext services to become widely used.

NAPLPS is the first interchange standard providing "blind interchange" which is desirable for electronic media envisioned for Videotex and Teletext. Blind interchange means that the sender and receiver of the information do not need any prior agreements or negotiation dialogue in order to meaningfully interchange information, except the agreement to conform to the standard. The conformance requirements specified here can be generally described as defining the rules (syntax) for conforming interchange at the coding interface; as well as the execution (semantics) to be applied by a conforming presentation process.

For more information regarding the NAPLPS or membership on X3L2.1, please contact:

Thomas N. Hastings, Chair X3L2
Digital Equipment Corporation
146 Main Street, ML1-2/H26
Maynard, MA 01754
(617) 493-8109

Finding Files Fast

James A. Woods

Informatics General Corporation
NASA Ames Research Center
Moffett Field, California 94035

January 15, 1983

ABSTRACT

A fast filename search facility for UNIX is presented. It consolidates two data compression methods with a novel string search technique to rapidly locate arbitrary files. The code, integrated into the standard *find* utility, consults a preprocessed database, regenerated daily. This contrasts with the usual mechanism of matching search keys against candidate items generated on-the-fly from a scattered directory structure.

The pathname database is an incrementally-encoded lexicographically sorted list (sometimes referred to as a "front-compressed" file) which is also subjected to common bigram coding to effect further space reduction. The storage savings are a factor of five to six over the standard ascii representation. The list is scanned using a modified linear search specially tailored to the incremental encoding; typical "user time" required by this algorithm is 40%-50% less than with naive search.

Introduction

Locating files in a computer system, or network of systems, is a common activity. UNIX users have recourse to a variety of approaches, ranging from manipulation of *cd*, *ls*, and *grep* commands, to specialized programs such as U. C. Berkeley's *whereis* and *fleece*, to the more general UNIX *find*.

The Berkeley *fleece* is unfortunately restricted to home directories, and *whereis* is limited to ekeing out system code/documentation residing in standard places. The arbitrary

        find / -name "*<filename>*" -print

will certainly locate files when the associated directory structure cannot be recalled, but is inherently slow as it recursively descends the entire file system to mercilessly thrash about the disk. Impatience has prompted us to develop an alternative to the "seek and ye shall find" method of pathname search.

Precomputation

Why not simply build a static list of all files on the system to search with *grep*? Alas, a healthy system with 20000 files contains upwards of 1000 blocks of filenames, even with an abbreviated */u* (vs. */usr*) adopted for user home prefixes. *Grep* on our unloaded 30-40 block/second PDP 11/70 system demands half a minute for the scan. This is unacceptable for an oft-used command.

Incidently, it is not much of a sacrifice to be unable to reference files which are less than a day old—either the installer is likely to be contactable, or the file is not quite ready for use! Well-aged files originated by other groups, usually with different filesystem naming conventions, are the probable candidates for search.

Compression

To speed access for the application, one might consider binary search or hashing, but these schemes do not work well for partial matching, where we are interested in portions of pathnames. Though fast, the methods do not save space, which is often at a premium. An easily implementable

space saving technique for ordered data, known as incremental encoding, has been adapted for the similar task of dictionary compression [Morris/Thompson, 1974]. Here, a count of the longest prefix of the preceding name is computed. For example,

```
/usr/src
/usr/src/cmd/aardvark.c
/usr/src/cmd/armadillo.c
/usr/tmp/zoo
```

transforms to

```
 0 /usr/src
 8 /cmd/aardvark.c
14 armadillo.c
 5 tmp/zoo
```

If we choose to delimit the pathname residue with parity-marked count bytes, decoding can be as simple as (omitting declarations):

```
fp = fopen ( COMPRESSED_FILELIST, "r" );
while ( (count = (getc ( fp ) & 0177)) != EOF ) {
        for ( p = path + count; (*p++ = getc ( fp )) < 0200; )
                ;                      /* overlay old path with new */
        ungetc ( *--p, fp );
        *p-- = NULL;
        if ( match ( path, name ) == YES )
                puts ( path );
}
```

where *match* is a favorite routine to determine if string *path* contains *name*.

In fact, since the coded filelist is about five times shorter than the uncoded one, and the decoding is very easy, this program runs about three to four times as fast as the efficient *grep* on the expanded file.

Speedier Yet

Useful as it is, there is still room for improvement. (Aside: this code is best inserted into the distributed *find*. There is no need to burden UNIX with another command [and manual page] when we can improve an existing similar program. Conveniently, there is no two-argument form of *find* so we can fill the vacuum with an unadorned

        find name

to perform the function.)

Notice that the above code fragment still searches through all the characters of expanded list, albeit in main memory instead of disk. It turns out that this can be avoided by matching the name substring **backwards** against a reversed pathname, until the boundary delineated by the repetition count. Assuming *namend* points to the final character of a NULL-byte prefixed *name*, then replace *match* by

```
for ( s = p, cutoff = path + count; s >= cutoff; s-- ) {
        if ( *s == *namend ) {          /* quick first char check */
                for ( p = namend - 1, q = s - 1; *p != NULL; p--, q-- )
                        if ( *q != *p )
                                break;
                if ( *p == NULL ) {
                        puts ( path );
                        break;
                }
        }
}
```

This is more easily understood by considering three cases. If the substring lies wholly to the right of the cutoff, the match will terminate successfully. If there is an overlap, the cutoff becomes "soft" and the match continues. If the substring lies completely to the left of the cutoff, then a match would have been discovered for an earlier pathname, so we need not search these characters! Technically, *cutoff* must be re-anchored to *path* immediately after matches. This condition is omitted above for the sake of clarity. Statistics on overlap have not been garnered, but a 40-50% speedup is consistently observed.

The author has not discovered this refinement in the literature.

Two Tier Technique

Shell-style filename expansion without undue slowdown can be had by first performing the fast search on a metacharacter-free component of *name*, then applying regular expression syntax "globbing" to these selected paths via the slower recursive *amatch* function internal to *find*. Ergo,

        puts (path);

becomes

    if (globchars == NO | amatch (path, name))
            puts (path);

where *globchars* is set if *name* contains shell glob characters. Using wildcarding, a primitive *man* command might be

    vtroff -man 'find '*man*'"$1"'.[1-9]''

Diminishing Returns

Production *find* code at Ames exacts a further 20-25% space compression (entropy reduction) by assigning single non-printing ascii codes to the most common 128 bigrams. ".c" and ".P" figure prominently. Room for these codes is made by reserving only 28 count codes for the likeliest "differential" counts (the interline difference between one prefix count and the next), along with a "switch" code for out-of-range counts (remember the possible 1024 byte pathnames, courtesy BSD 4.2). Printable ascii comprises the filename residue. We will not dwell on this rather *ad hoc* means, which barely reduces search time.

Other algorithms to address the time-space complexity tradeoff such as Huffman or restricted variability coding [Reghbati, 1981] do not look promising—they only change an I/O-bound process to a compute-bound one. Some experiments were done with the inverted file programs *inv* and *hunt*. Here, process startup overhead (the *fgrep* call to disambiguate "false drops") and space consumption (full pathnames plus an index) make *inv* invocations noncompetitive. Boyer-Moore sublinear search [Boyer, 1977] or macro model methods [Storer/Szymanski, 1982] might be employed, but must concern typically short 4-10 character patterns and equally short post-compression pathname content, for all their added complexity.

To conclude, we are content to scan 19000 filenames in several seconds using 180 blocks and two extra pages of C code.

REFERENCES

Boyer, R. S. *A Fast String Searching Algorithm*, Commun. ACM, Vol. 20, No. 10, October 1977.

Morris, R. and Thompson, K. *Webster's Second on the Head of a Pin*, Unpublished Technical Memo, Bell Laboratories, Murray Hill, N. J., 1974.

Reghbati, H. K. *An Overview of Data Compression Techniques*, Computer, Vol. 14, No. 4, April 1981.

Storer, J. A. and Szymanski, T. G. *Data Compression via Textual Substitution*, J. ACM, Vol. 29, No. 4, October 1982.

1983 Software Distribution Tape Submissions

Several contributions of software for the (first) 1983 USENIX distribution tape have been received. Mike O'Dell of Lawrence Berkeley Laboratory has gone through them and wrote the summary presented below. All 1983 Institutional members including binary license holders will receive all contributed material for which there are no AT&T license restrictions.

The next article in this issue of *;login:* describes the procedures followed by the office when sending distribution tapes. **Please note that each Institutional member must send a copy of its license(s) to the office with its 1983 membership form.**

The office expects to send tape release forms to all 1983 Institutional members in April.

Contents of the 83.1 USENIX Tape Submissions

The "restrictions" deal with AT&T licensing provisions and do not represent any other positions by the submitters (e.g., commercial use of the submissions).

Submitter: Brian Harvey

Affiliation: Lincoln-Sudbury High School and Atari

LOGO implementation Version 3

Restrictions: none

Submitter: Martin Tuori

Affiliation: Defense and Civil Institute of Environmental Medicine
Downsview, Ontario

bench — a UNIX System performance benchmark suite
This is a VERY nice piece of work, and eminently useful to people trying to tune their system.

man — manual pages for everything

src — assorted utilities

Restrictions: none

sys — V7 drivers
Dicomed COM device via DR-11B
Modified TM tape driver
Xylogics disk controller

mdec — bootstrap code for Xylogics controller

Restrictions: V7 or later source license

Submitter: Gary Perlman

Affiliation: UC San Diego and Bell Labs

MENUNIX — a program for Exploring User Interfaces.
  The submitter emphasizes this is **not** a production "shell" and was originally created only as an experiment.

Data Analysis Programs — interesting statistics tools for UNIX
  These programs interconnect with the usual pipe interface, giving a nice toolkit for exploring small to moderate data sets.

Restrictions: none

Submitter: Yoram Shoham

Affiliation: Geotronics Corp.

libarg — an argument line cracker

Restrictions: V7 or later source license

spool — a line printer spooler

cmd — some random utilities

Restrictions: none

Submitter: J. D. Wise

Affiliation: EE Department, Rice University

EDIT — a screen editor based on UNIX *ed*

Restrictions: V7 or later source license

Submitter: Geffrey Kodosky

Affiliation: National Instruments

s6 — some tools for extracting cost information from files and including them in proposals

Restrictions: none

diag — a restricted UNIX environment for stand-alone utilities and diagnostics
  This allows diagnostic programs to be written in C and have decent user interfaces. It sure would be nice if this existed for processors besides the PDP-11!

Restrictions: V6 or later source license

Submitter: Steven McGeady

Affiliation: Tektronics

System III *uucp* with "all known bug fixes"
  The submitter also included a paper copy of "all known bug fixes", but did not include it in machine-readable form so it cannot be included.

Restrictions: System III source license

USENIX Association Software Distribution Tapes

One of the benefits of Institutional membership in the USENIX Association is the right to receive tapes containing member-contributed software. These tapes are distributed by the Association office once or twice a year, depending on the contributions made.

The Association must abide by the licensing provisions of AT&T when distributing software to Institutional members. We do this by receiving copies of the pages of each Institutional member's license(s) that show:

- the name of the institution holding the license,
- the version(s) of UNIX the institution is licensed for and whether it is for source or binary,
- the type, serial number, and location of the CPU, and
- the signatures of AT&T and the institution.

The Association must also protect itself and the people and institutions who contribute software. We do this by receiving two signed copies of an Association-provided release form from each Institutional member. The release forms are mailed to the Institutional delegate of each institution. The release form is used:

- to relieve USENIX and the contributers of any liability for the software provided,
- to confirm that the institution still has the license, and
- to allow the delegate to specify which of the distribution tapes is to be sent if the institution holds more than one license.

The release form that will be used this year is very similar to that used in previous years. The Association has been advised that it cannot send distribution tapes to Institutional members who are unable or unwilling to complete the release form.

This year the license pages mentioned above are being requested with the Institutional membership application so we will have all necessary information on hand when the release forms are being prepared. The institution will be responsible for providing the office with documentation of subsequent license changes or additions. Licenses will be verified with AT&T before the release forms for each distribution are mailed to the Institutional member.

The software contributed may be covered by several different licenses, depending on what is contributed. It is separated into sets of software covered by the same AT&T license or by no license. Each Institutional member receives a distribution covered by one type of license that it holds. The following table shows the licensed material that may be received by the holder of a given source license.

license held	may receive material covered by
Version 6	Version 6 only
PWB	Version 6 or PWB
Version 7	Version 7 only
32V	32V only
System III	any of the above licenses

AT&T states that binary license holders may not receive source material that was derived from AT&T-licensed material. Additionally, under a given AT&T binary sub-license the holder may not receive covered binary material from a source other than the licensor. However, they may receive source material that is not covered by license.

If there have been no software contributions that are covered by a member's license and no contributions that are not covered by any license, then that Institutional member will not receive a distribution. However, this rarely happens.

If an institution has more than one license it may specify on the release form which distribution it wishes to receive. Distributions for other licenses may be requested from the office.

What UNIX Documents Would You Like USENIX to Offer?

The Association is investigating, subject to obtaining the appropriate copyright releases, printing UNIX documents and manuals needed by its members. The manuals would probably be offered in the 6"×9" format. We would like to know if you would like this service to be undertaken, and exactly what documents and how many of each you will be needing during 1983. Please mail a statement of your projected needs for 1983 to the Association office.

If you know of sources for UNIX manuals that sell to the general public please let the office know.

If the Association offers manuals in the future they will be priced at a discount to members.

USENIX Association Office Report

The Association office has been following up on questions received at UNICOM, handling 1983 memberships, finishing distributing the 1982 tapes, preparing for the next distribution tape (see the two related articles elsewhere in this issue), and receiving an awful lot of phone calls.

All 1982 Institutional members should have received their 1982 distribution tape or a letter explaining why they have not received it. As of March 1 we still have not received 80 release forms for 1982 tapes.

New procedures for verifying licenses for the software distribution tapes were developed with the assistance of AT&T. **The office must be sent a copy of each Institutional member's license(s) with the 1983 membership form.** Before any licensed material is sent to an Institutional member the license at the office will be verified with documentation provided by AT&T. It will be up to the member to provide adequate documentation of any changes to the Association.

Renewal forms for 1983 were sent to Institutional members in February after the license-verification procedures were worked out.

As of March 11 there were 338 Individual and Public members and 121 Institutional members for 1983. (The 1982 membership figures were 402 Individual and Public members and 300 Institutional members: 151 with Educational licenses and 149 with other licenses.)

Tom Strong
Executive Director

Assistance Needed

The following requests for information have been received at the Association Office. If you can help with any of these please contact the person listed **and** send the information to the Office.

A version of UNIX that runs on a Spectra 70 or IBM 3
    Jim Tuell
    Foothill College
    12345 El Monte Road
    Los Altos Hills, CA 94022
    (415) 948-8590, x259

A 3270 emulator for UNIX
    Joe Gondek
    Resdel Engineering Corp.
    7655 Old Springhouse Road
    Mclean, VA 22102
    (703) 448-0054

List of Table of Contents Entries for *;login:* for 1982

November Issue — Volume 7, Number 5

December Issue — Volume 7, Number 6

USENIX Association

Application for Individual or Public Membership
For Calendar Year 1983

Please type or print very clearly

[ ]   New

[ ]   Renewal   [ ]   With changes to existing USENIX records

　　　　　　　　　　Old address: _____

　　　　　　　　　　_____

　　　　　　　　　　_____

　　　　　　　　　　_____

[ ]   Individual Membership: $30

　　　　[ ]   Non-Disclosure covered by institution with source license

　　　　[ ]   Non-Disclosure covered by institution with binary license

　　　　Institutional affiliation: _____

　　　　Nature of affiliation: _____

[ ]   Public Membership (Not covered by Non-Disclosure): $30

Mailing address:

Your name: _____

_____

_____

_____

_____

Phone: (_____) _____

Network address: _____

[ ]   Overseas airmail, add $9.00

[ ]   Invoice required, add $6.00 bookkeeping charge

Check enclosed: $_____

Return completed form to:

<div align="center">

USENIX Association
P.O. Box 7
El Cerrito, CA 94530

</div>

You will receive a card acknowledging your membership as soon as it is processed.

USENIX Association
Application for Institutional Membership for Calendar Year 1983

Please type or print

[ ] New   [ ] Renewal   Name of Institution _____

Dept / Campus / Plant site: _____

Full name of institution holding the license if different from above:

_____

The annual dues depend on the type of license held; check one:

    [ ] $100: Educational license

    [ ] $300: AT&T or Subsidiary (non-voting membership)

    [ ] $300: Other license

For all licenses owned indicate type by **S** (for source) or **B** (for binary)

    [ ] Mini-UNIX   [ ] Version 6   [ ] PWB/UNIX   [ ] Version 7   [ ] 32V
    [ ] System III   [ ] System V   [ ] UNIX/TSS   [ ] UNIX/UNIVAC
    [ ] UCB 2.xBSD   [ ] UCB 4.xBSD   [ ] Other: _____

Name and address of the Institutional delegate. This person will receive all offical correspondence and the renewal notice for next year.	Name and address of the person to receive the newsletter and software distributions.

Phone: (_____) _____   Phone: (_____) _____

Network address: _____   Network address: _____

[ ] Check enclosed: $_____   [ ] Invoice required

Authorized Signature: _____ Date: _____

Please return the completed form to the address below with copies of the following pages of the license for your plant site or campus: the signature page and the pages that show the version of UNIX you are licensed for, whether it is for source or binary, the name of the institution owning the license, and the type, serial number, and location of the CPU(s). If you have more than one license please send the above information for each license.

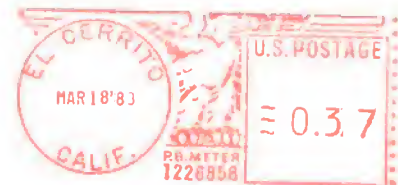USENIX Association
P.O. Box 7
El Cerrito, CA 94530

This form **must** accompany your purchase order or payment

First Class Mail

Mr. Christopher A. Kent   I1
Purdue University
Dept. of Computer Science
Room 442, Math Science Bldg
West Lafayette, IN 47907

If you are **NOT** a USENIX member for 1983
your membership number in the upper right corner
of the address label is enclosed in parens

See the articles inside for information on why
you and your institution should be
members of the USENIX Association